



## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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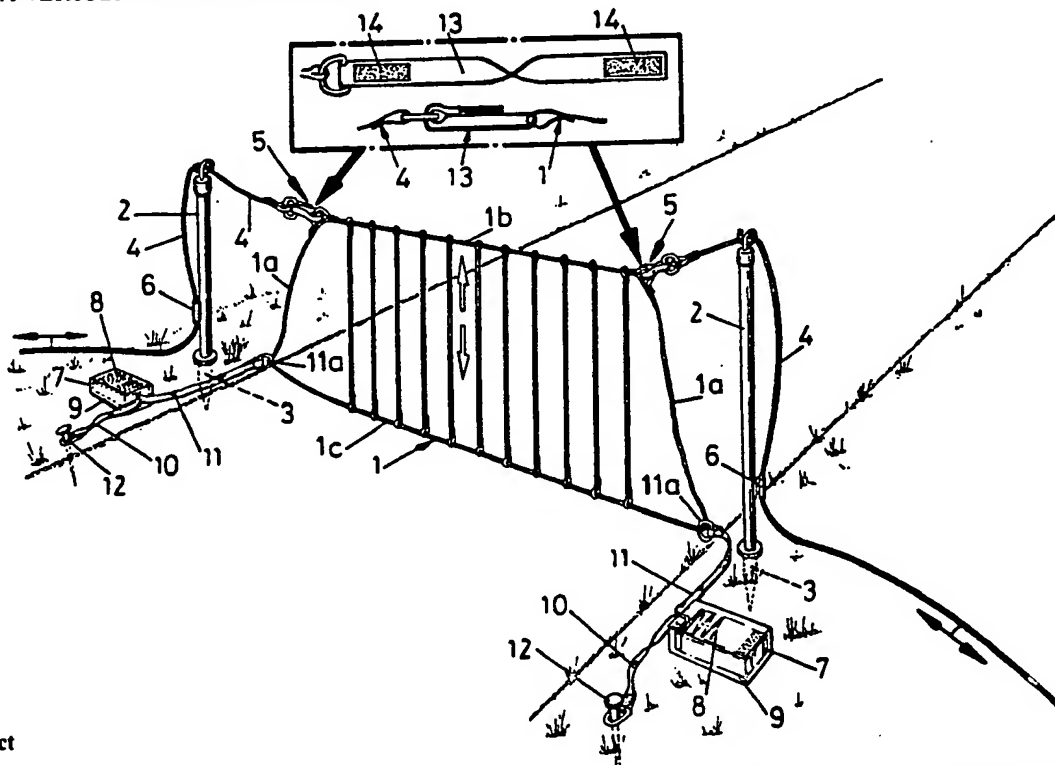
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(54) Title: A VEHICLE ARRESTING DEVICE



(57) Abstract

A vehicle arresting device (1) comprises a vehicle barrier adapted to be placed in the path of an oncoming vehicle so as to be accelerated thereby from rest, and restraining means (7) for restraining the barrier with reference to a fixed anchorage and causing controlled deceleration to rest of the barrier and the vehicle.

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### A VEHICLE ARRESTING DEVICE

This invention relates to a device for arresting vehicles, in particular road vehicles.

It is often necessary for security purposes to enable a selected road vehicle to be brought quickly to rest with minimal damage to the vehicle or injury to its occupants and it is an object of the present invention to provide a device for this purpose.

According to the present invention there is provided a vehicle arresting device comprising a vehicle barrier adapted to be placed in the path of an oncoming vehicle so as to be accelerated thereby from rest, and restraining means for restraining the barrier with reference to a fixed anchorage and causing controlled deceleration to rest of the barrier and the vehicle.

Preferably, the restraining means comprises a textile web having two free ends for interconnecting the anchorage and the barrier and an intermediate portion which is doubled and joined so as to be torn apart when said ends are separated.

The barrier is preferably a net of textile material.

The invention will now be further described by way of example only, with reference to the accompanying drawings, in which:

Fig. 1 is a diagrammatic elevation of one embodiment of vehicle arresting device in accordance with the invention;

Fig. 2 is a similar view of a second embodiment;

Fig. 3 is a diagram illustrating the operation of a remotely controllable automatic lifting and supporting means for the arresting device;

Fig. 4 is a view similar to Fig. 2 of a third embodiment, and

Fig. 5 is a diagram in plan illustrating the mode of operation of the Fig. 4 embodiment.

Referring now to Fig. 1, the arresting device, which is

intended for arresting a motorcar or other road vehicle of similar size, comprises a vehicle barrier in the form of a net 1 shown in the raised position strung between posts 2 fixed in ground sockets 3. The net 1 is held in the raised position by deployment cords 4 connected by re-usable breakaways 5 to jamming cleats 6 on each post. The lower end of the net 1 is attached at each side to a restraining device 7 which comprises a length of webbing 8 folded into a bag 9 save for two protruding ends 10, 11 which are connected respectively to a ground anchor 12 and the net 1. The webbing 8 is woven in such a way that when the webbing ends are violently separated a woven double portion progressively tears apart. Such a "tear web" is well known in other applications and will therefore not be further described.

Normally the vehicle arresting barrier will be in an out of use condition with the net 1 in a lowered position lying horizontally on the road across which the barrier is arranged. Vehicles can thus pass over the net 1 without hindrance. On the approach of a vehicle to be arrested the net 1 is quickly raised into the upright position by pulling at least one of the deployment cords 4 and jamming it in its cleat 6 so that the cord when released supports the net. The breakaways 5 connected to the cords 4 are arranged to release as soon as substantial tension is exerted on the cords by the vehicle. Such a breakaway may be provided (as shown in detail in the inset of Fig. 1) by a length of webbing 13 connected at a looped end to a D-ring fitting at the end of the cord 4 and looped through the net 1 and back through the fitting for securement to itself by adhesive textile strips (e.g. Velcro) 14. As the oncoming vehicle drives between the posts 2 its front engages the net 1 and entrains it so as to tension the cords 4 and release the breakaways 5. At the same time the ends 10, 11 of the tear web restraining device 7 separate causing the double portion to tear apart and exert a controlled breaking force on the net 1 and the vehicle. By the time that the vehicle has been arrested part or all of the doubled portion of the tear web device 7 may have been

consumed. In the latter case the device 7 will require replacement but in the former the device may be reused until insufficient tear portion is available for the next occasion.

In the embodiment of Fig. 2 (in which the same reference numerals have been used where appropriate) the tear web devices 7 are secured to available anchorages such as a tree 15 or a lamp post or telegraph pole 16. Breakaways 5 serve the same purpose as in Fig. 1 but in the absence of the cleats 6 on special-purpose posts 2 each cord 4 passes through a jamming cleat 17 encased in a webbing tube 18 secured to a webbing strap 19 of adjustable length passing around the tree or pole 15, 16 and having hook and ring end fittings 20 and 21 which interengage to form loops 20.

In other respects the operation of the Fig. 2 embodiment is similar to that of Fig. 1.

Fig. 3 shows a variant in which flexible posts 2 are bent into the flexed position shown in full line and held there by a cord 21 fixed to the upper end of the post 2 and to a ring 22 slidable on the lower section of the post 2. The deployment cord 4 is connected to the ring 22, the arrangement being such that when the cord 4 is jerked with the post 2 sprung into the bent position the ring 22 moves from an unstable illustrated position upwardly along the post thereby allowing the post to spring into the upright position and automatically raise the net.

The illustrated vehicle arresting device has the advantage that the vehicle is brought to rest in a controlled manner without causing damage to the vehicle or injury to its occupants. Furthermore, depending upon the design of the net, the speed of the vehicle and other factors, the vehicle may come to rest with its front and sides enmeshed in the net so as to inhibit escape through the side doors, and the front wheels may engage in mesh openings so that the vehicle and the net are interlocked and it is impossible to escape from the net by reversing the vehicle. An important feature of the arresting device enabling proper engagement of vehicles of varying size is the sliding attachment (by means of a D-ring

fitting 11a) of the webbing end 11 with the respective end loop 1a of the net 1 so enabling the attachment point to move to an intermediate position between the upper and lower horizontal runs 1b, c of the net 1 as determined by the forces acting on the net. Because of this feature the upper horizontal run 1b of the net 1 reliably engages the bonnet of the vehicle while the lower run 1c engages underneath the front of the vehicle for possible entanglement with the wheels thereof.

Fig. 4 is a variant of the Fig. 2 embodiment in which similar parts have been given the same reference numerals and are not further described. The essential difference between the Figs. 2 and 4 embodiments is that the latter has the lower end of the net 1 attached at each side (by the sliding D-ring fitting 11a engaging the end loop 1a) to the webbing end 11 of the restraining device 7 at the opposite side of the net 1 such that these ends 11 cross in the path of the oncoming vehicle the front and sides of which become enveloped in the net 1 as illustrated in Fig. 5.

It will be appreciated that alternative restraining means may be employed in place of the tear web described and illustrated. For example, a mechanical braking device may be attached by a line to the net 1. However, the tear web is preferred because it is light, compact and maintenance-free.

CLAIMS:

1. A vehicle arresting device comprising a vehicle barrier adapted to be placed in the path of an oncoming vehicle so as to be accelerated thereby from rest, and restraining means for restraining the barrier with reference to a fixed anchorage and causing controlled deceleration to rest of the barrier and the vehicle.

2. A device as claimed in claim 1, wherein the restraining means comprises a textile web having two free ends for interconnecting the anchorage and the barrier and an intermediate portion which is doubled and joined so as to be torn apart when said ends are separated.

3. A device as claimed in claim 1 or 2, wherein the barrier is a flexible net and respective restraining means are provided for each side of the net.

4. A device as claimed in claim 3, wherein the restraining means at one side of the net are connected to the opposite side of the net.

5. A device as claimed in claim 3 or 4, wherein the net is laterally held by upper breakable suspension means and by lower connections to the restraining means, said connections being movable upwardly of the net, following rupture of the suspension means by an impacting vehicle, so as to ensure correct orientation of the net relative to the vehicle.

6. A device as claimed in any one of the preceding claims, wherein the anchorage is provided by a natural or man-made fixture and the restraining and suspension means have loops of variable size for engaging said fixtures.

7. A device as claimed in claim 4 or 5, wherein each suspension means includes a breakable section comprising a material loop of low breaking strength.

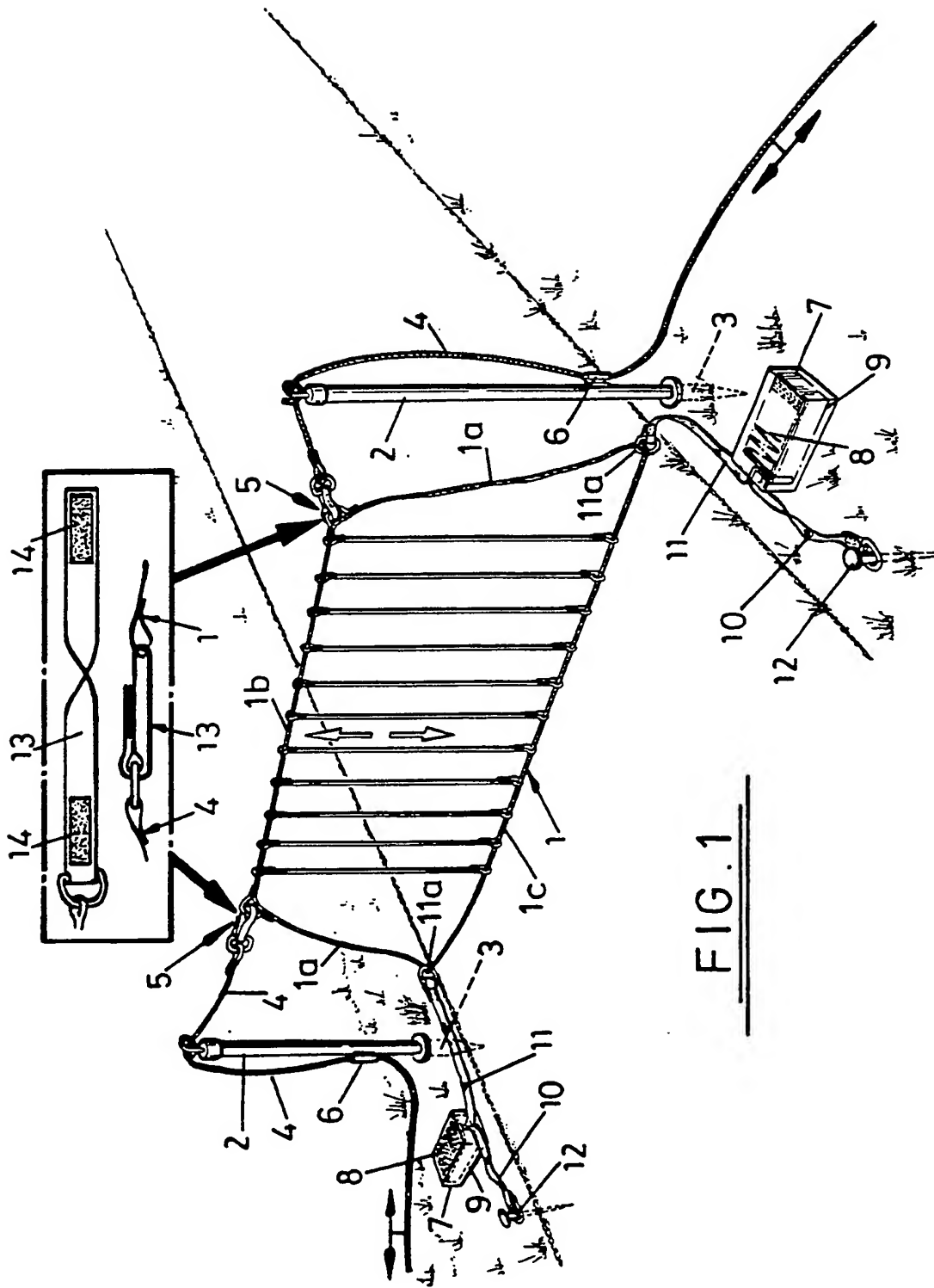
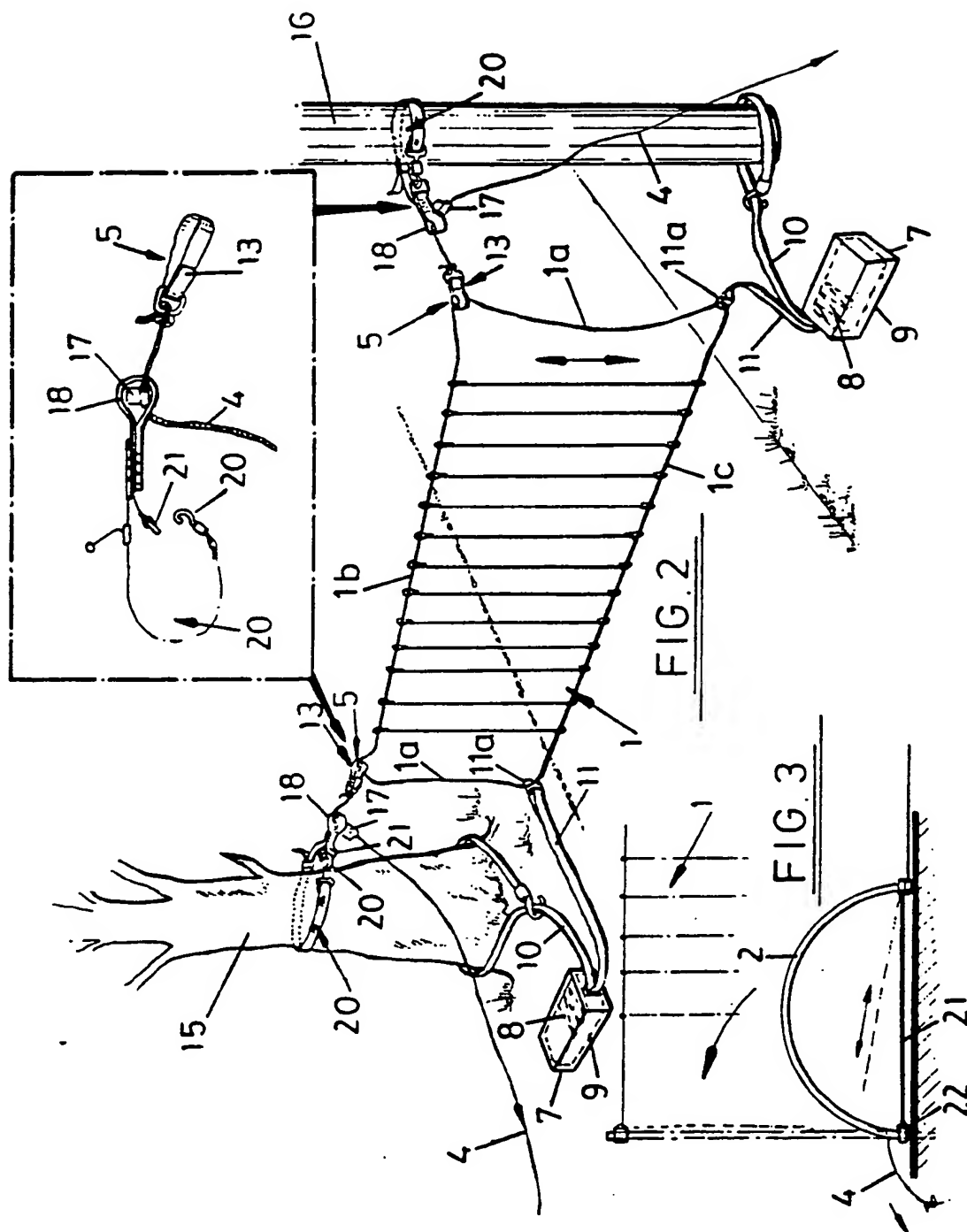
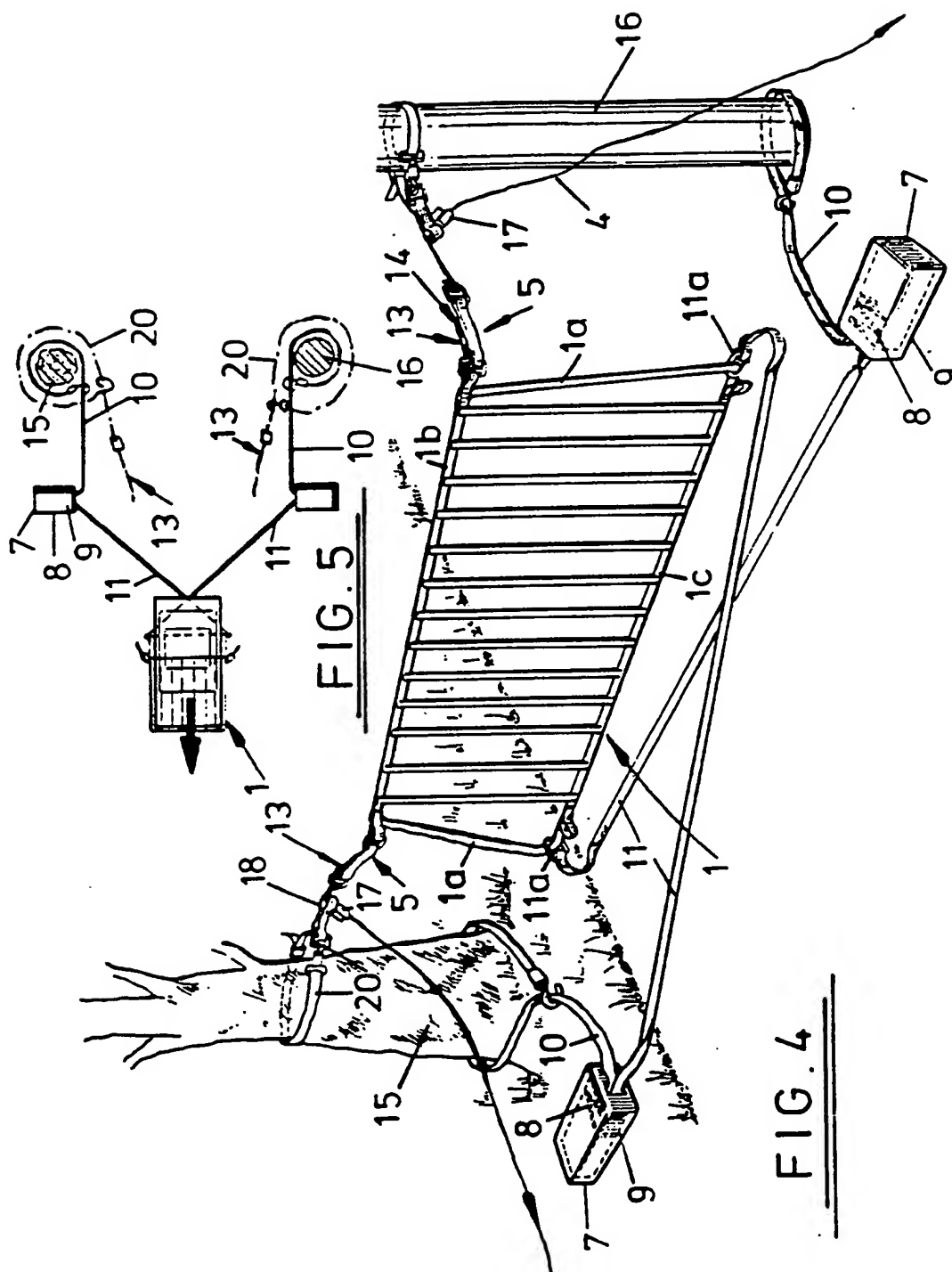


FIG. 1








# INTERNATIONAL SEARCH REPORT

International Application No PCT/GB 89/00449

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|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|-------------------------------------|
| <b>I. CLASSIFICATION OF SUBJECT MATTER</b> (if several classification symbols apply, indicate all) *                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |                                                                                                                |                                     |
| According to International Patent Classification (IPC) or to both National Classification and IPC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |                                                                                                                |                                     |
| IPC <sup>4</sup> : B 64 F 1/02, E 02 F 9/24                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                |                                     |
| <b>II. FIELDS SEARCHED</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                           |                                                                                                                |                                     |
| Minimum Documentation Searched <sup>7</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |                                                                                                                |                                     |
| Classification System                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Classification Symbols                                                                                         |                                     |
| IPC <sup>4</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     | E 02 F, B 64 F                                                                                                 |                                     |
| Documentation Searched other than Minimum Documentation<br>to the Extent that such Documents are Included in the Fields Searched <sup>8</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                |                                     |
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| <b>III. DOCUMENTS CONSIDERED TO BE RELEVANT <sup>9</sup></b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |                                                                                                                |                                     |
| Category <sup>9</sup>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup> | Relevant to Claim No. <sup>13</sup> |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | GB, A, 1114340 (BORGS FABRIKS) 22 May 1968,<br>see page 2, lines 3-46; figures 1,2                             | 1-4                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | --                                                                                                             | 5-7                                 |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US, A, 2854201 (R.B. COTTON) 30 September<br>1958, see claims 1-8; figures 1-10                                | 1-4                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | --                                                                                                             | 5-7                                 |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US, A, 2450328 (R.B. COTTON) 28 September<br>1948, see column 1, line 30 - column 2,<br>line 46; figures 1-4   | 1-4                                 |
| A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | --                                                                                                             | 7                                   |
| X                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | US, A, 2913197 (FONDEN et al.) 17 November<br>1959, see column 1, line 63 - column 2,<br>line 48; figures 1-5  | 1-4                                 |
|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      | ----                                                                                                           |                                     |
| <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> <p>* Special categories of cited documents: <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> </div> <div style="width: 45%;"> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"G" document member of the same patent family</p> </div> </div> |                                                                                                                |                                     |
| <b>IV. CERTIFICATION</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                             |                                                                                                                |                                     |
| Date of the Actual Completion of the International Search                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Date of Mailing of this International Search Report                                                            |                                     |
| 23rd June 1989                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       | 17 JUL 1989                                                                                                    |                                     |
| International Searching Authority                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    | Signature of Authorized Officer                                                                                |                                     |
| EUROPEAN PATENT OFFICE                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |  P.C.G. VAN DER PUTTEN     |                                     |

# ANNEX TO THE INTERNATIONAL SEARCH REPORT ON INTERNATIONAL PATENT APPLICATION NO.

GB 8900449  
SA 28484

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report. The members are as contained in the European Patent Office EDP file on 07/07/89. The European Patent Office is in no way liable for these particulars which are merely given for the purpose of information.

| Patent document<br>cited in search report | Publication<br>date | Patent family<br>member(s) | Publication<br>date |
|-------------------------------------------|---------------------|----------------------------|---------------------|
| GB-A- 1114340                             |                     | None                       |                     |
| US-A- 2854201                             |                     | None                       |                     |
| US-A- 2450328                             |                     | None                       |                     |
| US-A- 2913197                             |                     | None                       |                     |